ISSN 0228-4111

NEWSLETTER OF THE LONDON CHAPTER,
ONTARIO ARCHAEOLOGICAL SOCIETY
c/o London Museum of Archaeology
1600 Attawandaron Road, London, ON N6G 3M6

LONDON CHAPTER OAS

November & December 2005 05-7 & 05-8

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El Molto of the University of Western Ontario will be our January 12th speaker. He will be talking about his bioarchaeology work in the Baja region of California. Unfortunately, he forgot to provide a title for his talk before heading off to Egypt!

February will be Member's Night but so far only Chris Ellis has agreed talk. So we need more presenters! Come and regale us with your summer exploits.

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The meetings will be held at 8 pm at the London Museum of Archaeology, 1600 Attawandaron Road, near the corner of Wonderland & Fanshawe Park Road, in the northwest part of the city.

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ANNUAL RATES

Student	$15.00
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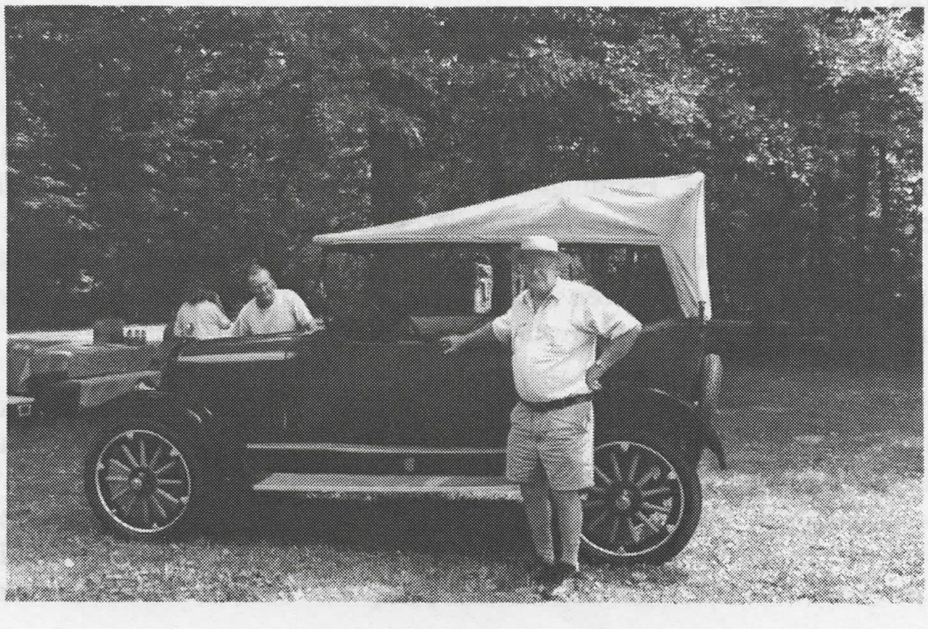
The London Chapter continues to purr along…we do need more articles for **KEWA**!! The editors have not harangued anyone for papers for some time because they seemed to be flowing in without such encouragement…but that time has now passed and we are back to cajoling people to submit stuff. Chris Ellis is also searching for speakers for monthly meetings so if you know of someone or would like to do a presentation, please contact him using the information on the **KEWA** cover. February will be our Members Night with several short presentations and Chris is desperately searching for speakers for that event. It is always well-attended, and people seem to enjoy themselves, but we need more volunteers so please come forward if you think you could do a short presentation on any a topic of archaeological interest. It is also near the end of the year so you should think about renewing your Chapter membership or **KEWA** subscription. Treasurer Jim Keron will be happy to take your money!

A major event in the 2006 year will be the Annual Meeting of the Ontario Archaeological Society, which will be held in London and hosted by our chapter next fall (see back page of this **KEWA**). We have booked the Best Western Lamplighter Inn & Conference Centre on Wellington Rd. S. for the conference and have one all day session already organized. However, we are planning concurrent Saturday sessions and are searching for participants. We would prefer to have a half day sessions dedicated to Preceramic sites (Paleoindian and Archaic) and Historic site archaeology but volunteer papers on other topics would be welcome too. So if anyone is interested in participating or organizing those sessions please contact Chris Ellis.

A good time was had by all at the chapter picnic held in conjunction with Archaeology Day at the Longwoods Conservation Area just west of London this past August. Among the many activities of Archaeology Day, local residents and other interested parties can bring in artifacts for identification. Here stalwart chapter member Stan Wortner (at right) helps identify one of the more recent artifacts brought to the Archaeology Day as London Chapter devotee and executive member Darcy Fallon (at left behind car) looks on. The artifact is a 1918 Model 11m Special Touring Gray-Dort. Gray-Dorts were assembled in Chatham, Ontario from 1915-1924. Of the over 20,000 produced fewer than sixty exist.



A Comparison of Lithic Debitage Analytical Techniques as Applied to an Early Archaic Bifurcate Base Point Assemblage

by Sherri Pearce

Lithic debitage tends to be the most abundant artifact recovered from archaeological sites and the significance of flaking debris and the type of information it may yield is important to the interpretation of the activities that were taking place at any given site. A number of different analytical techniques have been proposed for such materials, the validity of which has been much debated (e.g. Baumler and Downum 1981; Keron 2003a, 2003b; Magne and Pokotylo 1981; Maudlin and Amick 1989; Morrow 1997; Prentiss and Romanski 1989; Shott 1994). This paper applies two of these techniques to the debitage assemblage from the Prism 108 North site, a single component, Early Archaic, bifurcate base point-associated assemblage from near Hagersville, Ontario. The goal is to assess the efficacy, validity and efficiency of the applied techniques in documenting the nature of site stone reduction activities. The techniques compared are: the "interpretation-free" technique of Sullivan and Rozen (1985), and the more traditional typological analyses. The typology used in the last-named has been adapted and refined from several authors, notably, Andrefsky (1998), Deller and Ellis (1992), Frison (1968), Keron (2003a, 2003b), and White (1963). These techniques were chosen because they either have been: widely used on Archaic sites in Ontario (e.g. typological; see for example, Lennox 1986, Woodley 1990, 1997) or suggested to be potentially useful in analyzing Ontario Archaic assemblages (e.g. the interpretation free" technique; Park and Karaba 1997). Efficiency, or the amount of interpretive information yielded in relation to the time required to conduct the analysis, is an important factor for most Archaeological Research Management consultants; often, firms are pressured by clients to get reports and analyses done so that clearances from the Ministry of Culture may be obtained. Although exact timing was not recorded, personal observations on the amount of time and effort required for each technique also will be discussed.

The Prism 108 North Site

The Prism 108 North site is located near Hagersville, Ontario approximately 200 metres from Stoney Creek, and lies within the Carolinian-Canadian Transitional Biotic Province (ARA 2003: 3-4). Physiographically, the Prism 108 North site is situated on the Haldimand Clay Plain in an area of Farmington Clay Loam. Farmington Clay Loam is characterized by grayish brown clay loam over compact gray clay with limestone bedrock at a depth of about three feet (ARA 2003: 3).The field recovery techniques used on the Prism 108 North site that are of most concern for this study is the use of 1/4" mesh screen in the recovery of artifacts and the use of brick hammers and picks to remove and break up soils from the one metre square units.

Excluding five historic period artifacts, the Prism 108 North assemblage is comprised of 1577 pieces of chipping detritus and 72 formal and informal tools, amongst which are three Bifurcate Base projectile points. The projectile point metrics and observations can be found in the appendix and are shown in Figure 1. The projectile points recovered from Prism 108 North are most similar to the LeCroy type and the St. Alban's variety A as described by Chapman (1975: 126, 258-259; 1976:6) and Broyles (1971: 69, 73). The LeCroy type points have been radio-carbon dated to ca.

8300 BP (Broyles 1971:69; Chapman 1975:59; 1976:7; 1980:128). St. Alban's date slightly earlier with dates in the 8600-8800 BP range (Chapman 1975:258; 1980:128), although this dating is questioned by Broyles (Broyles 1971:73).

The other formal and informal tools recovered from Prism 108 North include one biface, as well as five biface fragments. Thirteen scrapers were recovered; five were end scrapers, five were side scrapers, two were end/side scrapers, two were concave scrapers and one was a scraper fragment. Two serrated flakes were also recovered. Finally, the remaining tools recovered were utilized flakes, numbering 43. The high incidence of utilized flakes demonstrates a preference for expedient tools, which is characteristic of the Early Archaic period and is a characteristic that some argue differentiates it from the earlier Paleo-Indian period (Ellis et al. 2004: 30; Ellis, et al. 1990:66). Five cores were recovered from the Prism site; these cores are all on Onondaga with the exception of one on Ancaster chert.

The types of chert used at the Prism site include Onondaga, Haldimand, Ancaster and an unidentified chert. Onondaga was dominant, representing 94.4% (n=1488) of the chipping detritus. Haldimand represents 4.1% (n=66) of the chipping detritus and Ancaster equals 0.9% (n=14). The unidentified chert accounts for 0.6% (n=9) of the total chipping detritus recovered. The Onondaga formations nearest to the Prism 108 North site belong to the Moorehouse member located near Stoney and Sandusk Creeks, approximately 18 and 12 kilometers respectively, to the southwest. Both of these localities have bedrock exposures that crop out at creeks (Eley and Von Bitter 1989:29). With that being said, the two nearest Haldimand chert sources, being part of the Bois Blanc formation, are located only 5 kilometers away from the site. However, both localities of the Haldimand chert sources are overlain by about 2 to 6 meters of Onondaga formation (Eley and Von Bitter 1989: 29). Therefore, some of the Onondaga utilized at the Prism site may have been obtained from these same outcrop areas. Ancaster chert, belonging to the Goat Island member of the Lockport formation, is located furthest away from the Prism site near Stoney Creek, Ontario (Eley and Von Bitter 1989:30); it is located approximately 37 kilometers northeast from the Prism 108 North site.

Analytical Considerations

Before proceeding to the analyses it is necessary to emphasize certain considerations which played a major role in the analyses and their interpretations. It is worth re-emphasizing that the soils of the Prism 108 North site are hard, heavy clay. As was stated above, during field recovery, occasionally brick hammers and picks had to be used to break up the clay. Such activities could seriously alter artifact counts, increasing the number of flake fragments recovered, and must have an effect on the use of certain analytical techniques (e.g. Shott 1994:100). For example, Sullivan and Rozen's (1985) "interpretation free" analysis relies heavily on ratios of flake fragments and broken flakes contrasted with complete flakes and debris when trying to distinguish between core reduction and tool manufacturing activities.

Furthermore, ploughing is another consideration that must be accounted for as this activity can also result in significant damage to lithic assemblages (e.g. Mallouf 1982:95-97). Some authors have tried to take into account the effects of post-depositional forces on thin flakes (Deller and Ellis 1992:89), arguing that such forces may increase flake counts and bias interpretations. The

exact effects of ploughing on lithic assemblages have not been well-studied; therefore, the affects of ploughing and soil matrices is unknown. The Prism site was located in a ploughed field of heavy clay soils; based on this fact and given the above observations, caution must be used in any inferences made about the assemblage that concern breakage and fragmentary flake frequencies.

Cortex as an indicator of reduction sequence has often been examined in many studies (e.g. Ahler 1989). In this study, the amount of cortex present has been recorded using an ordinal scale after Andrefsky (1998:104). The presence of cortex on flaking debris is often said to be representative of core reduction and early stage reduction techniques. Such an argument may be problematic as the amount of cortex present on the parent core will determine how much cortex is present on the flaking debris. Ahler (1989:90) states that "cortex profiles" will be dependant on the type of chert used and is dependant on factors such as the size of the original pieces. Cortex profiles will also be dependant on the type of technology employed. Complex, multi-staged techniques, in which a highly patterned tool is the objective, will result in the removal of cortex almost immediately in the reduction sequence. By contrast, in irregular core reduction, cortex may be present on the flaking debris in all stages of manufacture (Ahler 1989:90). Finally, bedrock chert sources which display tabular cortex may become virtually cortex-free at a very early stage (Ahler 1989:90). What all this implies is that one must determine what type of chert was being used at a given site and how it was being used. Most analytical techniques for debitage consider the presence or absence of cortex and use it as an independent line of evidence to reinforce their arguments or interpretations. However, some of these techniques such as Sullivan and Rozen's (1985) do not draw a clear linkage between technological types and the amount and type of cortex observed.

The cortical flakes at the Prism 108 North site number 370 pieces; this equates to just under 24% of the entire flaking debris. Cortex, as defined for this study, includes not only the cortical or adhering surfaces of the rock surrounding the chert nodules or beds, but also includes patina or other unflaked dorsal surfaces. Out of the 370 pieces exhibiting cortex, 47% (n=175) are classed as indeterminate. The majority of these indeterminate pieces have been classed as such because the amount of cortex was too small to make any accurate assessment. Tabular chert comprises 45% of the cortical assemblage, numbering 166 pieces. In stark contrast, nodular chert is only represented in 7% of the cortical assemblage (n=26). The ratio of tabular chert to nodular chert is 6:1. A preference for a primary chert source appears to be indicated by the high incidence of tabular chert. With that being said, it is possible that some, many or all of the "indeterminate" classed pieces may be from nodules of chert. If such were the case, then the ratio of tabular to nodular chert use would be dramatically altered. Also, Lennox (1993:5) has indicated that tabular cortex may not necessarily always be associated with primary source utilization; some secondary sources also display tabular cortex. In fact, large secondary tabular blocks of materials such as Onondaga can be collected from locations near outcrops such as along the Lake Erie shore east of the Grand River (Chris Ellis: personal communication) although their surfaces are often weathered to the extent they can easily be distinguished from the cortex on the primary outcrop sources.

If it follows that the Early Archaic people used more expedient tools and that the point forms were smaller, one could rule out a technological preference for larger pieces of chert, which are generally associated with bedrock outcroppings of primary sources as opposed to smaller nodular secondary sources. Regardless, even if all of the "indeterminate" class chert were nodular, the

ratio would change to an almost 1:1 split between primary and secondary sources. This, in and of itself, is interesting and poses some interesting questions for chert acquisition and preference during the Early Archaic. With all this being said, the evidence from the cortical flake assemblage does indicate that a primary chert source was favored and used by the group fairly extensively. The final 1% of the cortical assemblage is represented by 4 pieces of chert displaying simply a patina rather than a limestone surface.

Overall, the amount of cortex present on the Prism 108 North assemblage is fairly insignificant at 24%. In the analyses that follow, the majority of evidence indicates that core reduction was the main activity conducted at the Prism site. The lack of cortex would seem counter to the interpretation that claims core reduction was the dominant activity. However, given the arguments above, the lack of cortex may be explained by the overwhelming use of tabular chert, that Ahler (1989) has argued would lose its cortical surface fairly early in the reduction sequence. As for reduction strategy being a causal factor in the amount of cortex present, this will be considered in the conclusion and will be based on the findings of the analyses.

Of final note, size has also been seen as an indicator of general reduction activities with more larger debris produced earlier in the reduction sequence (e.g. Ahler 1989). There is considerable size variability amongst the debris and in order to get a preliminary estimate of this variability, all debris was passed through a series of nested 1", ½", ¼" and 1/8" screens. Less than 4% (N=63) were caught in the largest screen size but still many of these were quite large (average size=11.46 gm) and the ½" screen retained an additional ca. 40% of the flakes with an average weight of 2.70 gm. Flakes of these larger size are probably largely associated with the earlier stages of core reduction and hence, indicate it was a site activity. Since the site was excavated using ¼" there is little in the smallest size grade. Nonetheless, 41% of the debris was caught in the ¼" mesh and this debris averaged only 0.62 gm. Some of this material could be from later stages of manufacture although smaller debris is obviously produced even in earlier stage reduction activities. A main question therefore, is how important earlier versus later stages of reduction were at Prism and the two analytical techniques used here were chosen to address that question.

Analytical Techniques

Interpretation Free

Sullivan and Rozen (1985: 758) argue that "debitage analysis should be conducted with interpretation-free categories to enhance objectivity and replicability." They have created a hierarchical key with three dimensions of variability, each variable having two dichotomous attributes that supposedly are easy to discern and replicate (see Figure 1). This hierarchical sorting, using a limited number of attributes, results in a series of categories or gross types. The first variable in Sullivan and Rozen's key is a "Single Interior Surface;" this variable is indicated by positive percussion features such as a bulb of percussion, ripple marks or force lines. If these features can not be discerned, or if there is more then one occurrence of them, then a Single Interior Surface is not present (Sullivan and Rozen 1985:58). The second variable is "Point of Applied Force;" the point of applied force is where the intact striking platform intersects with the bulb of percussion. If the striking platform is absent, then there is no point of applied force (Sullivan and Rozen 1985:758). The third variable is "Margins;" a margin is considered intact if

there is visible flake termination and if lateral breaks do not interfere with taking width measurements (Sullivan and Rozen 1985:759). This category does not apply to specimens without a point of applied force. Moreover, the presence or absence of a Single Interior Surface overrides all other categories. If a flake exhibits one of the other variables but has multiple interior surfaces or none at all, then it will be considered debris. Debris is one of four mutually exclusive debitage categories defined by Sullivan and Rozen (1985). The others are Complete Flake, Broken Flake and Fragment (Sullivan and Rozen 1985: 759). While they focused on these categories in interpretation, they also used considered some other characteristics such as the amount of cortex present and debris size.

Sullivan and Rozen (1985) tested their analytical approach on two separate and very distinct projects in the southwestern USA and a discussion of these results provides examples of how they interpret the variability in the debris categories recognized by this technique. One project is the Tuscan Electric Power (TEP) St. John's Project and the other is the Pitiful Flats project; both of these sites are located in Arizona. These projects were quite dissimilar, representing different research questions. The TEP St. John's sites range in date from the late Paleo-Indian (6000B.C.) through to early Pueblo III (A.D. 1150-1200). The Pitiful Flats sites include ceramic sites and undated lithic assemblages. The Pitiful Flats ceramic sites date to Pueblo II (A.D. 950- 1000 to 1150-1200).

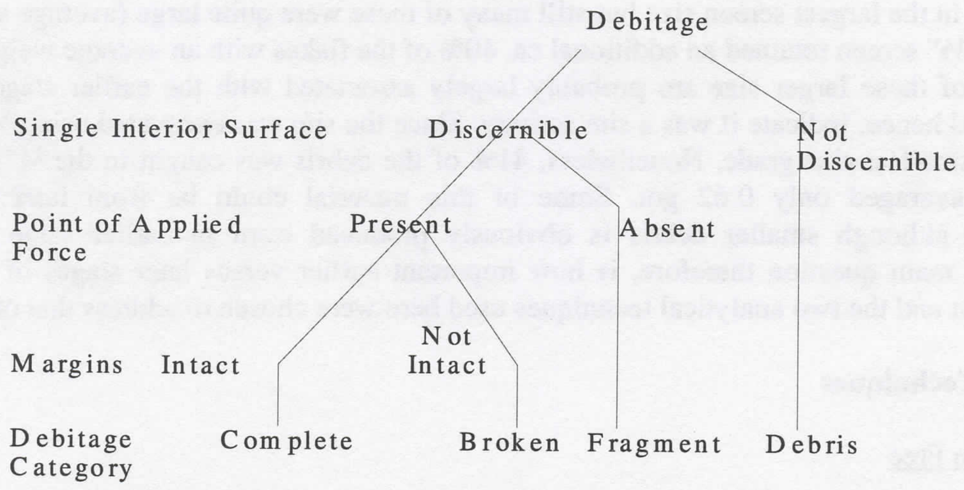


Figure 1: Debitage Sorting Criteria after Sullivan and Rozen (1985).

The 23 TEP St. John's assemblages were compared using a cluster analysis and it was argued the sites fell into four distinct site groups with different debitage profiles called I, IB1, IB2 and II (Sullivan and Rozen 1985:763; see Table 1). The first group, designated IA has been interpreted by Sullivan and Rozen (1985) as being related to core reduction as indicated by the high percentages of complete flakes and cores, both of which they interpret as indicators of early stage reduction activities. Group II is argued to be composed of by products from tool manufacture and is characterized by high percentages of broken flakes and flake fragments, characteristics they believe are more representative of later stage reduction activities. The other two site groups are

IB1 and IB2 and these two groups are intermediate between groups IA and II. IB2 is argued to be a by-product of intensive core reduction because it has a high percentage of "debris," which in their system, as noted above, is defined solely as any piece without a clearly discernible, single, interior surface. Sullivan and Rozen (1985) further argue that as the number of flakes removed from a core increase, the angle of platform on the core will also increase and as such, the core will produce more shattered pieces without such surfaces or more "debris." In terms of typological approaches their "debris" seems to be an equivalent category to "shatter" which typological analysts also argue is more characteristic of core reduction activities. Finally, because group IB1 falls between groups IA and II and also has considerably fewer pieces of debris than group IB2, Sullivan and Rozen argue that group IB1 type collections represent a mixture of both core reduction and tool manufacture.

Table 1: TEP St. John's Project Data (after Sullivan and Rozen 1985).

Artifact Category	Technological Group			
	IA	**IB1**	**IB2**	**II**
Complete Flakes	53.4	32.9	30.2	21.0
Broken Flakes	6.7	13.4	8.1	16.8
Flake Fragments	16.0	35.3	34.7	51.3
Debris	14.7	7.9	23.0	7.3

The Pitfiful Flats project sites were subdivided into preceramic and ceramic sites respectively as preliminary tests suggested these two kinds of sites were very different and represented different kinds of reduction activities. Table 2 shows the dissimilarities in the distribution of the debitage categories between the ceramic site lithic assemblages and the lithic site assemblages from that Project (Sullivan and Rozen 1985:769).

Table 2: Pitiful Flats Project Data (after Sullivan and Rozen 1985)

Artifact Category	Lithic Sites (N=5664)	Ceramic Sites (N=1633)
Complete Flakes	18.3% (n=1036)	24.5% (n=400)
Broken Flakes	16.9% (n=956)	9.8% (n=161)
Flake Fragments	57.5% (n=3260)	42.9% (n=700)
Debris	7.3% (n=412)	22.8% (n=372)

In the case of Pitiful Flats, it has been argued that the high proportion of broken flakes and flake fragments on lithic sites are related to the mechanical failure of thin flakes that break during biface and tool production (Sullivan and Rozen 1985:769). In contrast, the high proportions of

complete flakes and debris on the ceramic sites are argued to be related to core reduction activities (Sullivan and Rozen 1985:769).

The Sullivan and Rozen technique has had several criticisms, largely from those who have carried out experimental reduction of raw material to tools to see if the resulting debris assemblages meet the expectations of the technique provided by their creators. Morrow (1997:62) states, “the Sullivan and Rozen system is generally quite simple and replicable, but what does it tell us?” Morrow (1997) argues that the interpretation-free categories do not reveal much about variation in chipped stone technology other than simply the amount of time devoted to core reduction in comparison to tool finishing; many investigators wish to go beyond the most basic and simple of conclusions (see also Prentiss and Romanski 1989:92). Furthermore, Morrow (1997) finds in his experimental assemblages that the production of proximal and medial-distal fragments by soft hammer biface reduction (tool manufacture) may be more common, as they should be according to Sullivan and Rozen (1985), but that the differences are neither pronounced nor consistent. He also points out that Sullivan and Rozen do not take into account that flake fragments may be caused by factors other than lithic technology (Morrow 1997:62) such as raw material flaws. Mauldin and Amick (1989:83-85) have stated that original core size, as well as other factors, control the type and amount of debris types far more than does technological factors. Also, both Baumler and Downum (1989:106) and Tomka (1989:139) found contrary evidence to one of Sullivan and Rozen’s propositions that a greater number of complete flakes will be generated in core reduction versus bifacial reduction. Shott (1994:79) has explicitly noted that the validity of the Sullivan and Rozen (1985) technique is highly questionable based on the fact that several studies have failed to find consistent interpretations supportive of their propositions.

With these criticisms firmly in mind, for comparative purposes, I will compare data from these two southwestern projects against the Prism 108 North data. Both of the Sullivan and Rozen samples were collected from a sandy soil matrix that was not plough disturbed, which contrasts with the heavy clay soils of the Prism 108 North site that was once a ploughed field. In contrast to Sullivan and Rozen’s (1985) data sets, Park and Karaba (1997) applied the technique to a Small Point Terminal Archaic site in southern Ontario (AgHc-82) and as noted above, advocated that the technique be applied more widely on Ontario Archaic sites. This application is advantageous to this study as not only is Park and Karaba’s (1997) site located in Ontario and has been analyzed using the Sullivan and Rozen (1985) technique, but also, their assemblage is comprised of similar raw materials as those recovered from the Prism 108 North site. Furthermore, AgHc-82 is situated in a ploughed field (Park and Karaba 1997). Therefore, I will also compare the data from AgHc-82 against the Prism site data as a control. Using Sullivan and Rozen’s technique, Park and Karaba determined that the lithic assemblage from site AgHc-82 resulted predominantly from tool manufacture given the large number of broken flakes and flake fragments thought to be less characteristic of core reduction (Park and Karaba 1997:54).

The Prism 108 North assemblage has an extremely high percentage of flake fragments, but it also has an extremely high percentage of debris (Table 3). The dichotomous system of Sullivan and Rozen’s does not account for such a combination as the former suggests tool manufacture and the latter suggests core reduction. Therefore, other factors must be considered in this classificatory system. The Prism 108 North assemblage of broken and fragmented flaking debris totals 59%; the complete flakes and debris total 41%. The ratio of broken flakes and fragments to complete flakes

and debris would be 1.44 to 1. Following Sullivan and Rozen's interpretations, tool manufacture would have been the dominant activity carried out at the Prism 108 North site. When comparing the 108 North site with Sullivan and Rozen's (1985) "technological groups," the closest match is to Group IB1, which is representative of a mix of tool manufacture and core reduction with the Group IB1 ratio being 1.19 to 1. All of the other technological groups of Sullivan and Rozen's (1985) display significantly different ratios, as does Park and Karaba's (1997) assemblage (2.4 to 1). Of course, the high percentage of broken flakes and flake fragments at Prism 108 North may be a product of the fact it has been ploughed combined with the fact it had heavy clay soils, which necessitated certain excavation techniques, the overall result being a considerable amount of post-depositional breakage. This would result in a higher percentage of broken flakes and fragments, and lower the number of complete flakes but we would expect would not affect the amount of debris present. As noted, the high incidence of debris in the 108 assemblage can not be accounted for due to tool manufacture in the Sullivan and Rozen (1985) scheme. The only assemblage of Sullivan and Rozen's that has similar amounts of debris is their IB2 group, which they classify as resulting from intensive core reduction (1985:763). Therefore, one could argue Prism 108 North was predominantly an area of intensive core reduction activities, and that the suggestions of an emphasis on tool manufacture are due simply to post-depositional factors. Assuming that those factors would have equal effects at other sites that have been ploughed, such as Park and Karraba's (1985) AgHc-82 site, one might argue therefore that the higher ratio of broken flakes and fragments at AgHc-82 means it actually was a site with more tool manufacture than was seen at Prism 108 North. An examination of the amount of cortex present and other characteristics of the assemblage may help to clarify this issue.

Sullivan and Rozen (1985) argue that their Group II collections, comprised of tool manufacturing debris, have the lowest incidence of cortex; Group IA has the highest amount of cortex because this group is the result of core reduction. Groups IB1 and IB2 will be intermediate with respect to cortex between the other two groups (1985:764). The percentage of cortex in the Prism 108 North assemblage is 23.46% (Table 4). This percentage is most similar to Sullivan and Rozen's (1985:764) Area II assemblage, which has 24% cortical flakes. The lithics from Park and Karaba's (1997: Table 2) collection have an even smaller number or 15% cortical flakes. Both sites are seen as ones where tool manufacture predominated so a low amount of cortex is represented. However, since Prism 108 North also has a relatively low amount of cortex, this interpretation is contradictory to the idea that core reduction predominated at that site. It may suggest therefore that the high amount of broken flakes and flake fragments at Prism 108 North is due not to post-depositional factors and is a real pattern indicative of an emphasis on tool manufacture. Of course, as noted above, some have found even in experiments that complete flakes are not necessarily associated with only early stage reduction. The overall low percentage of cortex combined with the high percentage of "debris" at Prism would also appear to be counter-intuitive as the former suggests a dominance of later stages of lithic reduction whereas the debris is supposedly related to an emphasis on intense core reduction. However, such contradictions may be reflective of the chert source and material used. For example, if larger pieces were used at Prism then at the other sites (and recall primary sources of Onondaga seem to have been used most often at Prism), after the cortex was trimmed off there would still be a large mass retained that could be extensively reduced as a core and produce more debris whereas on smaller masses, the core becomes exhausted closer to its original size. One would expect in such instances that there would be few complete flakes, reputedly to be evidence of core reduction,

with cortex. Indeed, only 13% of the Prism complete flakes have cortex, a total not much different from the fragmentary and broken flakes. Yet even this explanation does not seem to hold up as in somewhat of a contradiction over half the pieces classified as debris at Prism had cortex (54%; Table 7). Regardless, an examination of the percentage of cortex has not helped to nullify the contradictory nature of the Prism assemblage characteristics. With that being said, Sullivan and Rozen (1985:764) state when dealing with their site groups IB1 and IB2, that cortex is not a reliable variable for determining technological grouping. As a result, Sullivan and Rozen (1985) recommend using striking platform variation in an attempt to determine best fit for technological grouping.

Sullivan and Rozen (1985) also propose that platform faceting and lipping will increase throughout the continuum of the reduction sequence. Consequently, the incidence of faceted platforms will be highest in samples resembling Area II where tool manufacture predominates (Sullivan and Rozen 1985:764). The Prism 108 North collection included 307 flakes with identifiable striking platforms. Out of these 307 flakes, 87 flakes, or 28.3% have faceting. The closest match to one of Sullivan and Rozen's technological groups is Group IB1, that has a faceting frequency of 26.3% and which they interpret as having a mix of both core reduction and tool manufacture. Group IB1 has a substantially higher percentage of flakes with striking platforms in contrast with IB2 (13.1%) and IA (8.1%); Group II has the highest percentage of faceted striking platforms (39.5%) which would follow Sullivan and Rozen's (1985) proposition that faceting increases throughout the reduction sequence. Park and Karaba (1997) did not consider striking platform morphology in their study.

Table 3: Frequency by Sullivan and Rozen (1985) Class

Class	Unid	%	Onon	%	Hald	%	Ancas	%	Total	%
Debris	3	0.19	460	29.17	5	0.32	6	0.38	***474***	***30.06***
Fragment	3	0.19	756	47.94	33	2.09	6	0.38	***798***	***50.60***
Broken	1	0.06	123	7.80	8	0.51	1	0.06	***133***	***8.43***
Complete	2	0.13	150	9.51	19	1.20	1	0.06	***172***	***10.91***
Total	***9***	***0.57***	***1489***	***94.42***	***65***	***4.12***	***14***	***0.89***	***1577***	***100***

Unid = Unidentified; Onon = Onondaga; Hald = Haldimand; Ancas = Ancaster

Therefore, at face value, most evidence would indicate that, following Sullivan and Rozen's (1985) propositions, the Prism 108 North lithic assemblage is the result of a mixture of tool production and core reduction. Tool manufacture is evidenced by the relatively high percentage of faceted flakes, the higher ratio of broken/fragments to complete/debris and finally, the low percentage of cortex in the assemblage and on the complete flakes. Core reduction is indicated by the high percentage of debris and the high percentage of cortex in that category. However, the data is somewhat contradictory and is complicated by the possible effects of post-depositional processes on the assemblage.

Table 4: Cortex Frequency by Sullivan and Rozen (1985) Class

Chert Type	Debris	Fragment	Broken	Complete	Total	%
Unidentified	2	0	0	2	*4*	*1.08*
Onondaga	251	75	12	21	*359*	*97.03*
Haldimand	2	2	0	0	*4*	*1.08*
Ancaster	3	0	0	0	*3*	*0.81*
Total	*258*	*77*	*12*	*23*	*370*	*100*
% of total cortical flakes within class	*54.43*	*9.65*	*9.02*	*13.37*	*23.46*	
% of total by class within assemblage	*16.36*	*4.88*	*0.76*	*1.46*	*(370/ 1577)*	

As noted above, one of the concerns of this analysis was the amount of time each analytical technique takes to complete. Even though it may seem straightforward and simple, it should be obvious at this point that Sullivan and Rozen's technique (1985) is not any less time consuming than a typological analysis, which is assumed to be the most time consuming of all techniques, since it was necessary here to examine the distribution of cortex and platform faceting. In using the Sullivan and Rozen (1985) technique, if so many variables must be examined and accounted for in order to slot an assemblage into a technological category, then time efficiency is lost and is no longer seen as one of the advantages of the Sullivan and Rozen (1985) technique. At this point then, it becomes a theoretical question of the value and effectiveness of using "interpretation-free" categories versus other approaches.

<u>Typological Analysis</u>

In Ontario, the most common form of lithic debris analysis tends to be based on stage typologies (e.g. placement into a series of types thought to be indicative of different stages of manufacture and, to some extent, the kinds of objects being modified such as biface or unifaces). There are many problems inherent in stage typologies; the main problem being replicability and standardization (Ahler 1989:87; Keron 2003a:2; Shott 1994:77). As Keron has pointed out, "flake typology is very much a learned skill and much of the learning is passed on through oral tradition (2003a:10)." Keron (2003a:2) has also noted that people classify the various morphological traits in different ways; what may be a cortex flake to one analyst may be a primary flake to another. Therefore, as one may see, stage typology can lead not only to confusion, but also, it begs the question of the validity of the interpretations made. Shott (1994:77-78) argues that there are three disadvantages to formal typological analyses; the first is that formal attributes "are inferred to be diagnostic of particular kinds of knapping behavior (1994:77)." The second problem Shott (1994:77) acknowledges is one that has already been discussed; the problem of replicability and standardization between observers. Finally, Shott (1994:78) argues that size is an equally important attribute and should also be considered in any analysis. Size determines the incidence

of formal attributes that may be present on flake debris (Ahler 1989:87). This trait has been partially controlled for here by the general size sorting using nested screens noted earlier.

A thorough reading of typological classificatory definitions was conducted (e.g. Andrefsky 1998; Deller and Ellis 1992; Frison 1968; Keron 2003a, 2003b; White 1963) to develop the flake typology used for analysis of the Prism 108 North assemblage. The various flake classes and their definitions may be viewed in the appendix. The data from the Prism 108 North assemblage is shown in Table 5. For comparative purposes, I have used data from the Laphroaig site (Woodley 1996) and the Kassel and Blue Dart sites (Lennox 1993). The rationale behind using these three sites is that they are all Bifurcate Base point sites related to the Early Archaic period. The Kassel and Blue Dart sites are situated in sandy soils. By contrast, the Laphroaig site and the Prism site are situated in heavy clay soils. All sites were located in previously ploughed fields; although the effects of ploughing on a lithic assemblage are not well researched, most investigators agree ploughing will alter an assemblage to some degree. This issue has already been discussed. These ploughed assemblages contrast with the experimental assemblages used primarily in this study, therefore, it is hoped that by using an actual archaeologically derived sample, a more accurate conclusion may be obtained. Finally, it should be noted that both Woodley (1996) and Lennox (1993) use different categories in their typological approaches from what I have used. Furthermore, both of these authors use different approaches from each other.

An interpretation of the Prism 108 North site based solely on my typological data alone, indicate that core reduction was the main activity being conducted on site with a lesser amount of early stage biface reduction and only a minor amount of tool maintenance and finishing activities. Barring the fragmentary flakes, which comprise 51% of the assemblage, shatter is the most numerous flake type at 30%. Shatter is generally associated with core reduction activities (Keron 2003b:53). This argument is further reinforced by the fact that the shatter recovered from 108 North has the highest incidence of cortex in the assemblage and that slightly more then half of the shatter exhibits cortex (Table 5). Other categories of flaking debris that are associated with core reduction found in the Prism assemblage are secondary decortication flakes, tertiary flakes and bipolar flakes. These categories combined with the shatter account for 33.35% of the assemblage. Bipolar core reduction is indicated by the presence of bipolar debris (Keron 2003b:51), coupled with the high incidence of shatter, which may also be associated with the bipolar technique (e.g. Binford and Quimby 1972). Categories representative of bifacial and unifacial reduction activities include biface thinning (13%), end biface thinning, biface finishing, biface retouch, biface thinning in retouch, and ventral unifacial retouch flakes (total excluding biface thinning: 2.34%). The total amount of biface reduction and tool manufacturing derived flaking debris accounts for 15.53%. Therefore, the ratio of core reduction activities to biface reduction activities is 2.17 to 1 suggesting at face value that the former was more important or at least a significant component of site activities. This interpretation of the Prism 108 North assemblage is complimentary to what has already been determined using, again at face value, Sullivan and Rozen's (1985) method.

One further observation to be made about the Prism 108 North assemblage is how the varying types of chert were being used differently. To demonstrate this point, ratios of biface thinning flakes to shatter were produced for each chert type with the exception of the "Unidentified" category. The Onondaga ratio is 0.40 to 1. The Haldimand ratio is 4.2 to 1. Finally, the Ancaster ratio is 0.33 to 1. These ratios indicate that Onondaga and Ancaster cherts were being used in a

similar fashion and that Haldimand chert was being used differently. Shatter is associated with core reduction and biface thinning is associated with biface manufacture. Therefore, the higher ratio of biface thinning to shatter in the Haldimand chert sample would appear to indicate that Haldimand was being brought into the site in a more finished form that only required thinning and later stage activities, while the Onondaga and Ancaster samples were being brought to the site in a rougher form requiring core trimming and reduction activities. It should be restated here that the cores recovered from the Prism site were on Onondaga and Ancaster cherts; Onondaga accounts for four cores, while Ancaster is represented by one core.

The Prism assemblage stands in stark contrast to the Kassel, Blue Dart and Laphroaig lithic assemblages, which have all been associated with biface thinning and resharpening activities. To begin with Laphroaig, Woodley (1996) has used seven categories for flake classification. These are: Primary and Secondary Decortication, Primary, Shatter, Fragments, Biface Thinning and Edge Finishing. Most of these categories are self evident with the exception of the Primary category. Woodley (1996:43) defines "Primary" as "large flakes removed to shape a core." This category would be equivalent to my tertiary flake category. In the Laphroaig assemblage, disregarding the fragment category, edge finishing flakes comprise the largest category at 109 pieces or 31%. This is followed by the biface thinning category at 19% (n=66) and finally, the core reduction categories at 12% (n=44). The Laphroaig core reduction to biface manufacturing activities ratio would be 0.25 to 1. There is a clear indication of a dominance of resharpening activities or later stage biface reduction happening at Laphroaig, followed by a lesser degree of biface reduction and an even smaller amount of core reduction. It is notable that Laphroaig has a large number of cores (N=10; half are bipolar pieces) despite having little debris (N=354) and this contrasts markedly with the presence of only five cores yet 1577 flakes at Prism 108. One might interpret the contrast to indicate Laphroaig was a largely exhausted assemblage where a number of worn out cores were discarded (see Woodley 1996:42) but not much reduced on site in contrast to Prism 108 where lots of cores were reduced and not exhausted and discarded.

Both the Kassel and Blue Dart sites have similar ratios to what is seen at Laphroaig. The Kassel ratio of core reduction to biface manufacture is 0.20 to 1 and the Blue Dart ratio is 0.25 to 1. Before examining the Kassel and Blue Dart findings, Lennox's (1993) typological categories will be defined. Lennox (1993) uses four categories in his analysis. These are: Primary, Secondary, Fragment and Shatter. The later two categories are again, self-evident. Lennox defines primary flakes as flakes from cores and secondary flakes as flakes from bifaces (1993:5). In the Kassel assemblage, primary flakes and shatter account for 8.4% of the total assemblage. Secondary flakes account for 42.2% and fragments account for 49.3%. Similarly, at the Blue Dart site, primary flakes and shatter comprise 10.6% of the assemblage. Secondary flakes comprise 42.2% and fragments comprise 47.2%. Given the low ratios of core reduction to biface manufacture and the high percentage of secondary flakes, both the Kassel and Blue Dart assemblages may be interpreted as resulting from biface thinning and resharpening activities. This interpretation is consistent with an absence of cores at those sites.

Table 5: Frequency by Chert Type and Class: Typological Approach

Class	Onondaga		Haldimand		Ancaster		Unidentified		Class Total	Class %	Cortex Total	Cortex %	
	#	Cortex	#	Cortex	#	Cortex	#	Cortex				a	b
Ventral Unifacial Retouch	1	0	0	0	0	0	0	0	*1*	*0.06*	*0*	*0*	*0*
Tertiary Flakes	12	4	4	0	0	0	0	0	*16*	*1.01*	*4*	*25*	*0.25*
Shatter	452	250	5	2	6	3	3	2	*466*	*29.55*	*257*	*55*	*16.3*
Nodule	1	0	0	0	0	0	0	0	*1*	*0.06*	*0*	*0*	*0*
Fragment	762	75	33	2	6	0	3	0	*804*	*50.98*	*77*	*9.6*	*4.88*
End Biface Thinning	1	0	0	0	0	0	0	0	*1*	*0.06*	*0*	*0*	*0*
Bipolar	30	2	0	0	0	0	0	0	*30*	*1.90*	*2*	*6.7*	*0.13*
Biface Thinning	184	18	21	0	2	0	1	1	*208*	*13.19*	*19*	*9.1*	*1.2*
Biface Retouch	14	1	0	0	0	0	1	0	*15*	*0.95*	*1*	*6.7*	*0.1*
Biface Finishing	12	1	2	0	0	0	1	1	*15*	*0.95*	*2*	*13*	*0.13*
Biface Thinning in Retouch	5	0	0	0	0	0	0	0	*5*	*0.32*	*0*	*0*	*0*
Biface Reduction Error	8	1	0	0	0	0	0	0	*8*	*0.51*	*1*	*13*	*0.1*
Secondary Decortication	7	7	0	0	0	0	0	0	*7*	*0.44*	*7*	*100*	*0.44*
Total	***1489***	***359***	***65***	***4***	***14***	***3***	***9***	***4***	***1577***	***100***	***370***		
%	***94.42***	***22.76***	***4.12***	***0.25***	***0.89***	***0.19***	***0.57***	***0.25***	***100***				

a = % of cortex within class;
b = % of cortex by class within assemblage.

Conclusions

The paper compared the Sullivan and Rozen (1985) technique with my own typological approach. As has already been stated, the analyses are in, more or less, agreement with each other about the types of lithic activities that were happening at the Prism site. However, the typological analysis allowed for some more specific or more detailed interpretations and the two techniques are more in agreement only if one assumes post-depositional factors have not altered the debris assemblages. Based on this assumption, the two techniques resulted in a similar conclusion that core reduction dominated or was occurring with intensity at the Prism site.

Sullivan and Rozen's (1985) technique was obviously unable to detect specifically what type of core reduction was utilized by the Prism 108 North knappers such as the use of bipolar reduction as revealed by typological analysis. Using Sullivan and Rozen's (1985) approach, I was also able to infer not only core reduction activities, but also some evidence of tool manufacture or maintenance. The ratios of broken and fragmentary flakes to complete flakes and debris were relatively close; 1.44:1. This ratio would argue for tool manufacture and maintenance as the dominant activity with core reduction also being practiced to a high degree. Such a finding is contrary to the other analyses that argue for a dominance of core reduction. However, as discussed, a higher frequency of fragmentary and broken flakes may be due to post-depositional processes although that conclusion is contradicted by some other forms of evidence. In any case, since most sites investigated in Ontario are in ploughed fields, techniques such as Sullivan and Rozen's (1985), whatever the other problems with the technique discussed by several other archaeologists noted earlier, probably can not be applied at face value to any of these ploughed sites as plough damage is bound to have an effect on certain of the debitage categories that system proposes are of use in making interpretations.

I was able to determine tool manufacturing activities were taking place based on several other data sources that Sullivan and Rozen (1985) proposed. For one, the examination of complete and broken flakes for platform faceting allowed me to infer tool manufacturing activities were taking place. If faceting was not considered, then an inference for tool manufacture would have been weakened. The high amount of cortical debris signaled that core reduction was present but the lack of cortex on the complete flakes allowed me to infer that these flakes were most likely produced from tool manufacture rather than from core reduction (and in fact, as the typological analysis argues, most flakes with platforms were actually from biface manufacture and not core reduction). As such, the conclusion that these complete flakes resulted from tool manufacture rather then from core reduction contradicts one of Sullivan and Rozen's (1985) main propositions and actually supports the claims of Baumler and Downum (1989: 106) and Tomka (1989:139) that tool manufacturing flakes, and particularly those from biface reduction, are often complete.

The typological analysis also indicated what lithic reduction activities were occurring on the Prism site. Core reduction, specifically bipolar core reduction, was determined to be one core reduction activity. Core reduction is followed to a lesser degree with early stage biface reduction and even lesser amounts of tool manufacture and maintenance. This finding is somewhat contrary to the findings drawn from Sullivan and Rozen's technique (1985).

It is felt that of the two approaches, the typological approach provided the most information from which to make inferences. The main problem with typologies, as has been stated in the introduction, is replicability and standardization. Barring this problem, I would argue for the use of a detailed, formalized typological approach for lithic analysis. The consideration of time constraints was stated in the introduction as a concern of this paper. Sullivan and Rozen's (1985) technique did not turn out to be any faster than a typological approach, especially when one considers the fact that striking platforms and cortex must be examined in order to draw a firm conclusion or to aid in interpreting contradictory results. Also, the Sullivan and Rozen (1985) technique was not as informative as the typological approach and results from their technique are somewhat contradictory to the typological analyses employed in that the findings from the technique indicate more of a bias toward tool manufacture perhaps because there are problems applying it on ploughed sites. Based on these conclusions, the technique that yielded the most information for amount of time spent on analysis and seemed most appropriate to a ploughed site with the hard soil clay matrices examined here, was the typological approach.

Acknowledgments

I would like to thank Dr. Chris Ellis for allowing me the opportunity to carry out this study, as well as for his advice, guidance and patience. I would also like to thank Paul Racher and ARA Ltd. for allowing me access to the Prism 108 North collection. In addition, thanks to Dana Poulton for not only acting as my liaison with Paul, but also for suggesting use of the Prism 108 assemblage for this project. Jim Sherratt's advice, insights, interest and support throughout this study were (and always will be) greatly appreciated. Finally, I would like to thank Brooke Milne for letting me use her nested screens for some analyses.

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Appendix 1: **Flake Typology and Point Measurements, Prism 108 North Lithic Assemblage**

Primary decortication flakes* -

- cortex covers the entire outer surface of the flake (cortex is defined as original interface surrounding the source matrix, as well as weathered surfaces or patina)

Secondary decortication flakes* -

- cortex covers only part of the outer surface of the flake

*all forms of decortication flakes will exhibit the following characteristics:

- presence of cortex located other than on the striking platform
- striking platform has very few facets (<3)
- striking platform at approximately 90 degrees to ventral surface
- pronounced bulb of percussion
- dorsal surface has low number of scars
- generally larger in size
- ventral surface lacks curvature

Tertiary flakes -

- generated from core trimming activities
- no cortex (<10%) on surfaces other than the striking platform
- striking platform has few facets and is at approximately right angles
- bulb of percussion present
- dorsal surface has low number of scars

Cores –

- cores may be single-ended, double-ended or polymorphic depending on the number of and location of prepared striking platforms present
- a) unprepared core - primary flaking is restricted to the preparation of a striking platform
- b) prepared core - systematic lateral preparation of core into a preferred shape of: pyramidal, discoidal or conical
- c) nucleus - exhausted core

Bipolar -

- shattered or pointed platforms with little or no surface area
- evidence of force at both ends of the flake
- angular polyhedral cross section
- steep lateral edge angles
- pronounced ripple marks
- lack of distinction between dorsal and ventral flake surfaces

Bifacial retouch flake -

- thin and flat transverse cross section lacking pronounced dorsal ridges
- thin longitudinal cross section
- frequently curved so the flake is concave on the ventral surface
- feathered edges both laterally and distally
- high number of dorsal flake scars which are bidirectional
- striking platform faceted, narrow, lipped and sometimes ground
- little or no cortex on dorsal face
- expanding flake shape
- small or subdued bulb of force
- obtuse platform to ventral surface angle
- acute platform to dorsal angle
- dull edge of tool is usually obvious

Unifacial retouch -

- almost always a complete flake
- platform approximates the ventral surface of a uniface and is right angled. Small, circular to irregular in outline with a pronounced bulb of force.
- parallel scars on dorsal surface (old working edge)
- pronounced curvature
- usually feathered termination (may also be hinged or stepped)
- lateral edges are often expanding
- probable use wear on working edge adjacent to platform including a series of small, overlapping, hinged or stepped out flake scars are present

Shatter -

- no clear ventral or dorsal surface
- no visible negative bulbs of percussion
- no systematic alignment of cleavage scars
- no orientation - distal or proximal, dorsally or ventrally
- blocky fragments

Fragmentary flakes -

- distal portion of a broken flake
- no striking platform
- clear dorsal and ventral surfaces
- break termination proximally

Normal biface thinning flakes -

- large in relation to most other flakes, except for flakes used as tool blanks
- striking platforms are ground, faceted and acute-angled, usually exhibiting a lip
- lateral edges are consistently expanding
- curvature is usually symmetrical or distal and ranges from slight to pronounced
- smooth ventral surface
- dorsal surface exhibits parallel to convergent scars

Prism 108 North Projectile Point Metrics: Stage 4 Collection

Observations (Measurements in mm)		Provenience		
		1S 2E	1S 2W	2S 0E
Dimensions	**L**	17.1-	15.0-	32.3
	W	16.9	13.8-	22.8-
	T	4.1	5.2	6.3
Blade	**L**	10.8-	9.0-	15.1-
	W	16.9	13.8-	22.8-
	T	4.1	5.2	6.3
Base	**L**	6.7	9.8	15.0-
	W	10.2	9.0	Incomplete
	T	3.4	3.9	5.6
	SBC	7.1	9.6	Incomplete
Blade Configuration		NA Slight Serration	NA	Straight to slightly Concave - Serrated
Notching		Corner Notched	Stemmed	Stemmed
Inter-Notch Breadth		8.7	8.3-	12.0
Notch Depth		4.8	3.5	6.9-
Notch Height		6.7	9.8	14.8-
Notch Grinding		Absent	Present	Present
Shoulder Width- -		16.9	13.8-	22.8-
Shoulder Configuration		Down sloping	Up sloping	Up sloping
Basal Grinding		Absent	Present	Present
Depth of Bifurcate		1.5	1.1	4.1
Weight		1.2 grams	.9 grams	3.3 grams
Best Fit for Point Type		LeCroy or St. Alban's (variety A)	St.Alban's	LeCroy or St. Alban's (variety A)

- incomplete

- - adopted SBC from Andrefsky (1998:179). SBC: shoulder to basal corner.

Chasing Turtles: An Update

by William Fox

Well, I guess that I "came by it honestly", considering my childhood pursuits in Red Hill Creek (Duncan 1998:88) and my subsequent research collaboration with a turtle – "Tauromee" or Charles Garrad, as he is better known (Turner 1999:18). Nevertheless, my first contact with the Eastern Box turtle did not occur until a trip to southern Indiana in the 80's, in search of Wyandotte chert ("Indiana hornstone")(Figure 1). The sight of these creatures roving the Carolinian forest floor made a lasting impression (Fox 2003:12), but the major catalyst for my turtle quest was the sight of some perforated shell rattles from the 17th century Neutral Lake Medad site in the Canadian Museum of Civilization collections, which launched a five year research project, which continues to this day.

This study has put me in contact with institutions and individuals throughout the eastern and midwestern U.S. and, of course, Ontario. Collections managers have kindly provided information regarding their holdings of archaeological and ethnographic specimens, and some even forwarded detailed documentation. Personal funds paid for a recording project at the Rochester Museum & Science Centre; while travel support was provided by the Canadian Museum of Civilization for several trips to the Smithsonian museums and the McClung Museum at the University of Tennessee, Knoxville. It is amazing who one meets on such trips – who knew that Dr. Paul Parmalee had retired to an emeritus position in Knoxville? I was honoured to meet him and he even provided some autographed reports! As always, such endeavours involve a certain amount of serendipity.

So it was that I was able to record some box turtle shell rattles from the Historic Neutral Walker site, while attending a conference in Akron, Ohio earlier this year. The conference organizer arranged for local collectors to bring in specimens for my review and, to my amazement, there were four rattles which had been excavated from the Walker site near Brantford by John Steele in 1944 and were illustrated by Frank Ridley (1961:17, Plate 5 r,s) in his seminal volume concerning the Neutral. Again, who knew that these Ontario artifacts had been purchased by a Wisconsin collector, whose widow in Florida was in the process of selling off the material to various individuals including this Ohio collector?! At this same conference, I was able to meet delegations from the eastern Cherokee of North Carolina and Seneca of Tonawanda Reserve in upstate New York; as well as Creek and Delaware individuals. Permission was granted from all parties to present my research to the gathering and the Director of Education for the Museum of the Cherokee Indian agreed to assist in obtaining documentation concerning specimens reburied under NAGPRA by their tribe.

One of the Walker specimens recorded in Akron displayed a unique asymmetric carapace perforation pattern scattered down one side of the shell, resembling nothing so much as a constellation. I was put in mind of a discussion with George Hamell, who had suggested that the quartz pebble pellets used in many such rattles might emit light through a piezoelectric reaction. Some weeks later, at the CAA annual meetings in Nanaimo, I was approached by Dr. Margaret Hanna of the Royal Saskatchewan Museum, who remembered my interest in rattles and wished to recount an experience. Margaret had participated in a Cree sweatlodge ceremony and

witnessed the glow of quartz pebbles shaken vigorously in rawhide covered rattles – what wonderful confirmation! This observation also suggested that carapace "acoustic perforations" in leg shackle shells may have had several functions, especially in regards to night time ceremonies (Figure 2).

Other memorable experiences over the past five years have included working in the curatorial facilities of the Smithsonian Museum of Natural History and National Museum of the American Indian in Maryland (what amazing collections and storage infrastructure!); discovering red ochre painted rattles in a drawer at the McClung Museum, containing material from 1930's WPA excavations in the Tennessee River valley, which appear to date to the Late Archaic period; recording a contact period Dallas Phase rattle at the same museum (this phase is not supposed to post-date 1500 A.D.); spending hours at the Carnegie Museum in Pittsburgh reconstructing juvenile box turtle plastrons from a Monongahela site; meeting with Jim Rementer of the Delaware Nation of Oklahoma on a very hot July day in Bartlesville to record several traditional hand-held rattles from their collections; and the frustrating lack of specimens from Southeastern Mississippian archaeological sites, apparently due to poor faunal preservation. Most recently, I have been attempting to fill gaps in the database through contacts with the Shawnee of Oklahoma.

So, "what is this all for?," you might ask. I have to admit that this quest has "expanded my horizons" from a conference paper and intended journal article to a museum monograph to, perhaps, a small volume published by a Native group, who might benefit from its sale. We'll see. The Cherokee of Oklahoma have expressed an interest in using the information in their attempt to reestablish some of their traditional women's ceremonies, and the Smithsonian has requested information for an upcoming exhibit on Native dance at their New York facility. Perhaps, in the end, this esoteric research will reap some substantial social benefits…..on the back of a turtle!

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Figure 1: Eastern Box Turtle (Terrapene carolina carolina)

Figure 2: Cherokee Leg Shackle Rattles

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